

INSTALLATION AND MAINTENANCE MANUAL FOR BA-220 DualBeam BARCODE READER



revised 1/31/2009



Doing It Better - Because We Care.

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FOREWORD

The purpose of this manual is to provide information on how to install, configure, operate, and maintain the Barcode Automation BA-220 DualBeam Barcode Reading and Access Control System. Barcode Automation Inc. has made every effort to insure that the information in this manual is both accurate and adequate. It is recommended, in the interest of safety and efficiency, that each section be read carefully before installing or servicing this system.

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INTRODUCTION

This section contains information for proper installation, operation and maintenance of the Barcode Automation BA-220 DualBeam Barcode Reader. Each item in this section should be read completely before proceeding to other sections of this manual. If there are any questions contact Barcode Automation, inc at 1-800-528-9167 for assistance.

FCC CLASS A STATEMENT

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this manual, may cause interference to radio communications. A class A computing device, as defined in Part 15, Subpart J of the Federal Communications Commission rules is designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residence is likely to cause interference in which case the user, at his own expense, will be required to take whatever measures necessary to correct the interference.

CDRH COMPLIANCE STATEMENT

This laser barcode reading system complies with Standard 21CFR, Subchapter J, for Class II laser products as set forth by the Center for Devices and Radiological Health. Any alteration or adjustment for Class II laser products is not authorized, and will void certification of the system as a Class II laser product. Figure 1 on page 5 shows the type and location of warning labels affixed to the reader in compliance to the CDRH standard.

SAFETY PRECAUTIONS

This Barcode Reader incorporates features that provide for maximum safety. However, it must be recognized that any equipment employing electrical voltage and emitting direct or scattered radiation may cause serious damage and/or personal injury if improperly handled. The following are recommended safeguards that should be observed at all times.

WARNING

Use of controls, adjustments or performance of procedures other than those specified herein may result in exposure to hazardous radiation or electrical voltages.

OPTICAL SAFETY

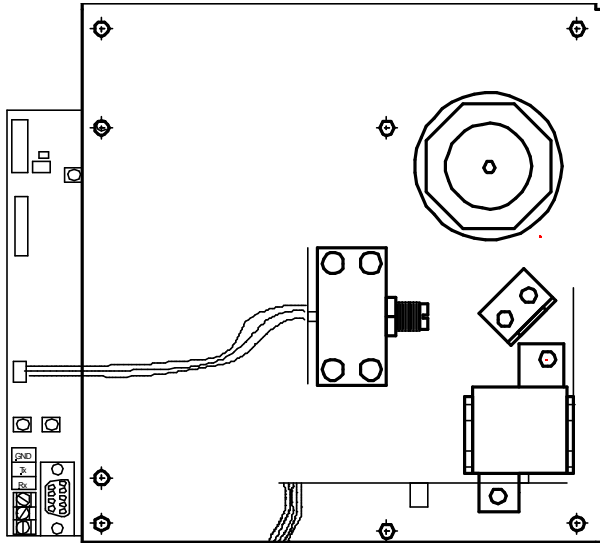
Never stare directly into laser beam. The laser diode is interlocked with the motor that turns the polygon mirror so that if the motor slows or stops for any reason the laser will be automatically turned off.

ELECTRICAL SAFETY

Disconnect the main power line before working on any electrical equipment. Always use insulated tools.

REQUIRED MAINTENANCE

The BA-220 laser window should be cleaned as needed with a non-abrasive glass cleaner. Optical components inside the reader should be inspected and cleaned at 6 month intervals. These include:



- Window glass both inside and outside
- 8 sided gold mirror wheel (Polygon)
- Small mirror below gold wheel (Polygon)
- “Fisheye” lens in the silver block below the small mirror

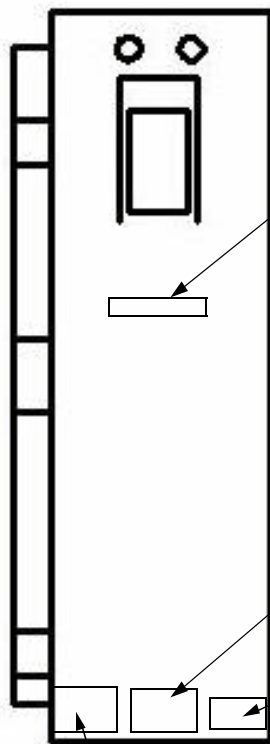
Optics should be cleaned with 100% denatured alcohol and soft material such as Kleenex® or cotton balls. **DO NOT USE LENS CLEANING MATERIAL or OPTICAL WIPES.** These will scratch the metal of the gold wheel and degrade reader performance. Cleaning is best accomplished by removing the decoder module from the reader as follows:

1. Remove wiring harnesses from decode module at J1, J5, and J13.
2. Remove 4 nuts securing the decode module to the main board and remove it from the reader.
3. Clean the inside window glass on the reader enclosure.
4. Clean all 8 mirror sides on the gold wheel (polygon).
5. Clean the small mirror directly below the gold wheel (polygon).
6. Clean the lens in the receiver block located below the small mirror.
7. Place decode module back in the reader enclosure. Reinstall the 4 nuts and tighten securely.
8. Reinstall the wire harnesses at J1, J5, and J13. Do not loosen or remove any hardware other than that specified in these directions. Any alteration to the laser alignment may result in poor reader performance. If you have a question contact BAI at 800-528-9167.

Warning Label Placement



CAUTION
LASER LIGHT WHEN OPEN
DO NOT STARE INTO BEAM



AVOID EXPOSURE
LASER LIGHT IS EMITTED
FROM THIS APERTURE

Barcode Automation, inc.
Model BA-220
CONFORMS TO
UL STD 294
Serial # 220-0804030
800-528-9167
AC 115V 50/60Hz 0.8A

CLASS II LASER PRODUCT
THIS PRODUCT CONFORMS
TO DHHS REGULATION 21
CFR SUBCHAPTER J.
NOT USER SERVICEABLE

CAUTION
LASER LIGHT
DO NOT STARE INTO BEAM
658nm LASER DIODE
1.0 MILLIWATT MAX. OUTPUT
CLASS II LASER PRODUCT

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General Specifications

INPUT POWER

For 115VAC input:

Voltage 100 - 125VAC, 50 - 60 Hz

Current draw typically 0.8 Amps @120VAC

Power dissipation 40 Watts typical, 100 Watts maximum with heater on

For 24VDC input:

Voltage 22 - 30VDC

Current draw 2.5 Amps

Power dissipation 30 Watts typical, 60 Watts maximum with heater on

CIRCUIT PROTECTION

For 115VAC input:

2.5A 250V fuse located on mainboard

For 24VDC unit:

3A resettable PTC located on mainboard

ENVIRONMENTAL

Operating Temperature -22°F to 130°F (-30°C to 55°C)

Relative Humidity 10% to 100% non-condensing

COMMUNICATIONS

RS232 serial port configured for 8 data bits, no parity, 1 stop bit

Baud rate selectable 1200, 2400, 4800, 9600, 19200, 38400

USB Port - requires driver installation on computer

Wiegand 26 bit format

Timing of Wiegand signal is adjustable

General Specifications

READ TRIGGER

Continuous Scan

Loop Detector Input

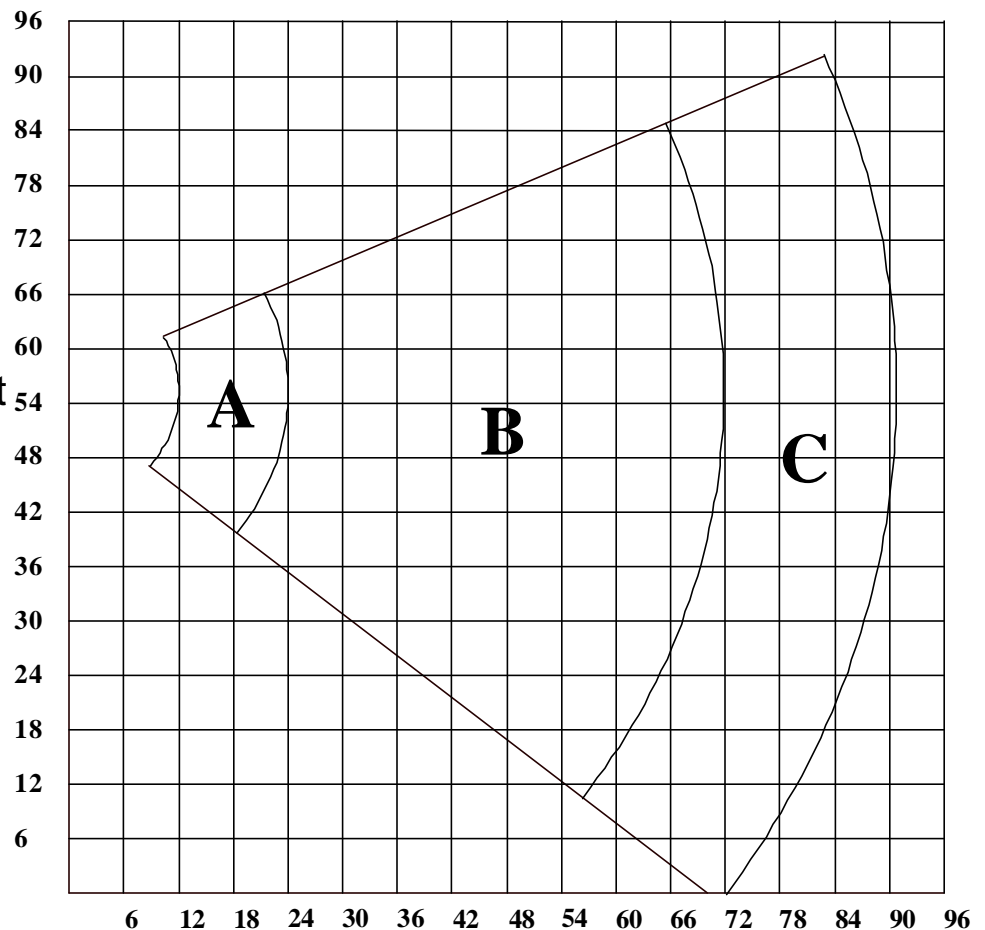
OPTICAL

Reading area begins 24" from enclosure and extends out to 72"

The laser lines are vertical with a fan shaped read area.

Read area chart
in inches
above pavement.

This assumes that
the center of the
BA-220
DualBeam
window is 54"
above the
pavement.



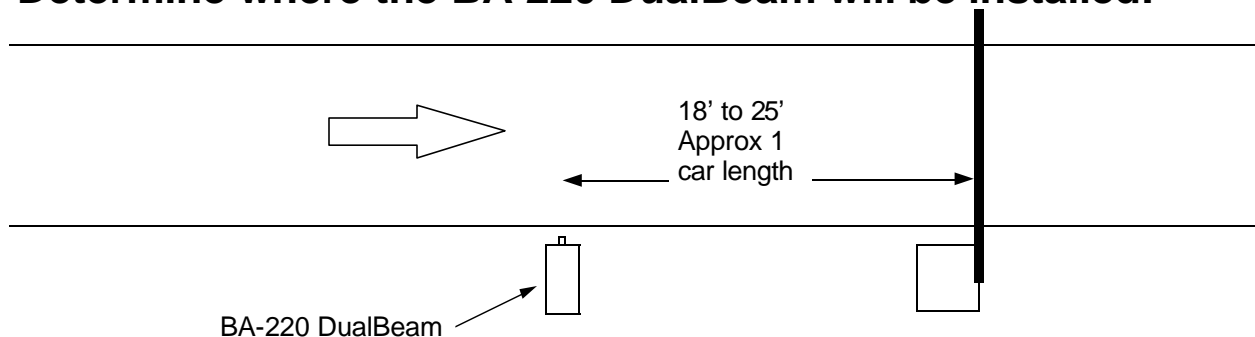
Reading distance in inches from the body of the BA-220 DualBeam. Barcodes will be read in zones A, B, and C under normal conditions. Zone B coverage is guaranteed in all reasonable driving conditions.

Basic Installation and Setup steps

1. Determine where the Reader will be installed
2. Run wiring to the mounting point for power & communications
3. Pour concrete pad for post mount
4. Secure mounting post and BA-220 DualBeam to the pad
5. Connect power & communications to the reader
6. Place decals on vehicles **(the same side the reader will be on)**
7. Turn Power Switch On
8. You're up & running

If the BA-220 DualBeam was not set up for your specific installation at the Factory you will have to configure the Reader after it is mounted in place. To do this refer to the Operation and Configuration Manual for details.

Determine where the BA-220 DualBeam will be installed:

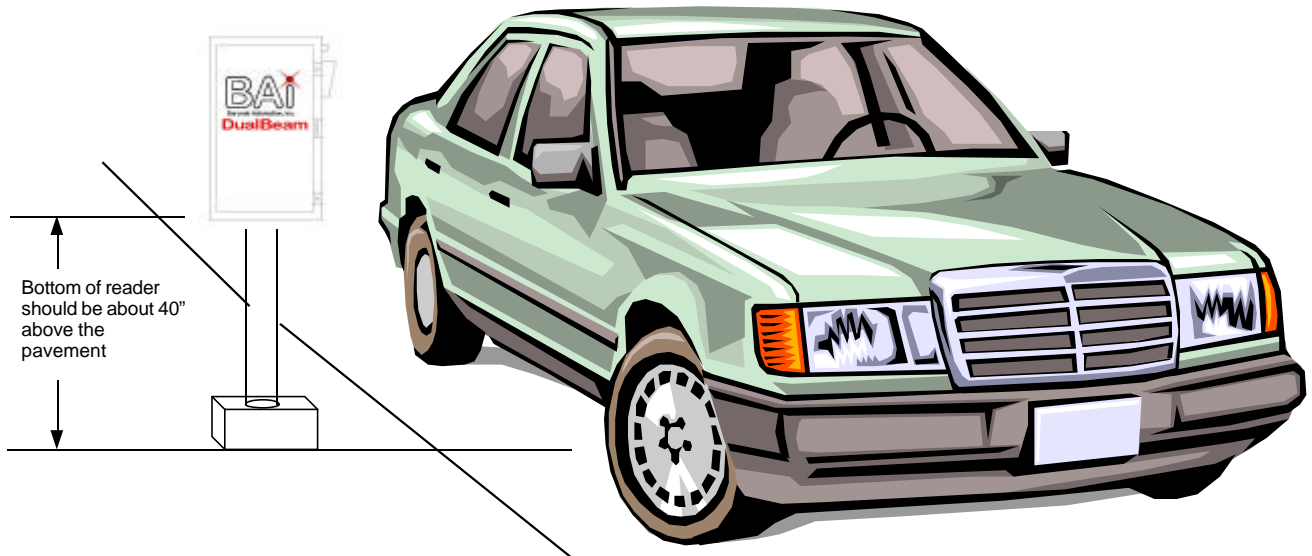


Overhead view of Installation

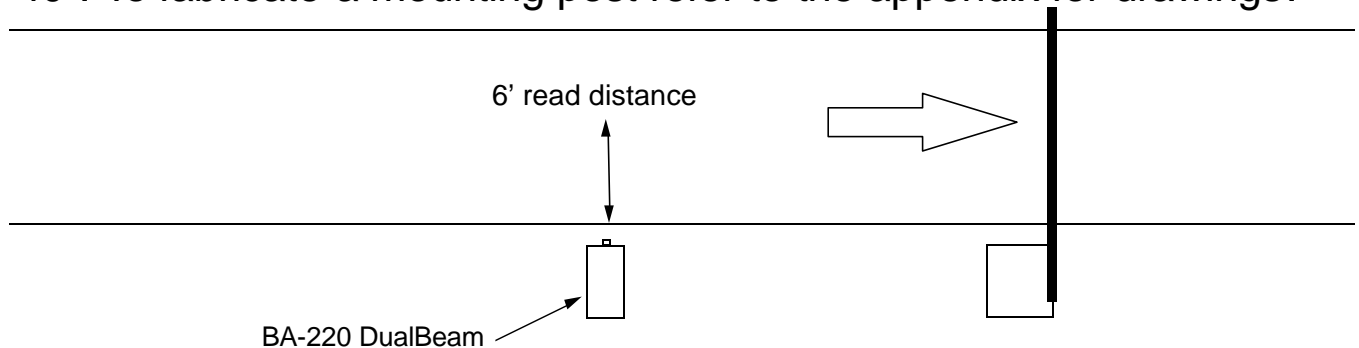
As shown in this figure, the reader should be located at least one car length (plus a small gap) before the gate. It does not matter which side of the road it is mounted on, as long as the vehicle decals are on the same side. **Always locate the reader and decals on the same side of the car.**

Determine where the BA-220 DualBeam will be installed:

In this side view, the important dimension is the height of the reader above the pavement. The general rule of thumb is for the **bottom** of the reader to be 40" above the pavement where the vehicle tires are located.

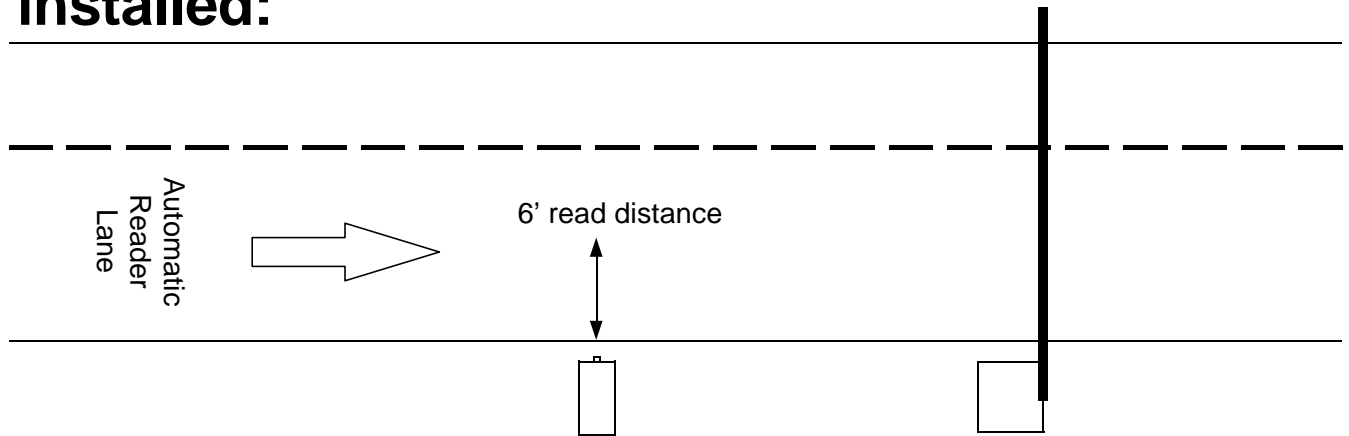


BAI offers a standard mounting post that is 34" high. It is intended to be used on a 6" curb or concrete mounting pad for a total height of 40". To fabricate a mounting post refer to the appendix for drawings.



The reader should be mounted close to the edge of the road or drive without being in danger of collision with a vehicle. It has a 6 foot reading distance which will extend out across the road or drive. Traffic should not pass by **closer** than 2 feet from the reader. Protective bollards or barriers around the BA-220 DualBeam is recommended.

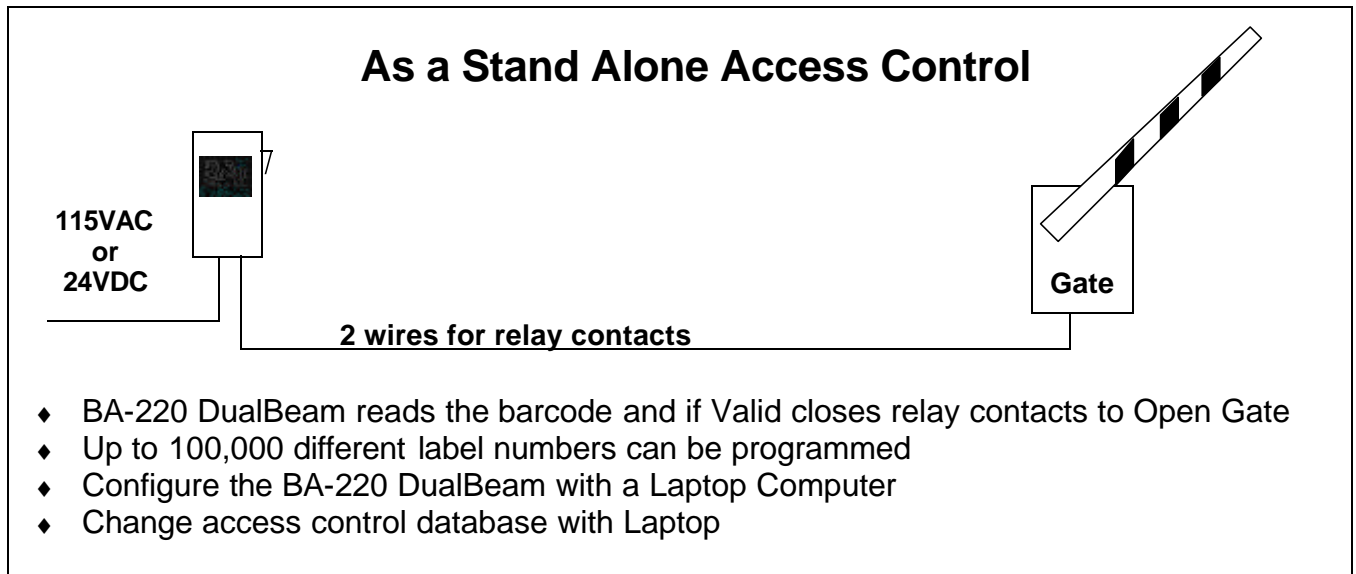
Determine where the BA-220 DualBeam will be installed:



In some locations the vehicle drive is very wide, as shown in the illustration above. In these cases, we recommend painting lane lines or stripes to indicate where the vehicle must pass by in order to be read by the BA-220 DualBeam.

What Wiring do I need?

For most applications, there are three basic ways to use the BA-220 DualBeam Reader.



In this situation, the BA-220 DualBeam reader acts as the Access Control. Barcode decal numbers are programmed into the reader and set to grant or deny access based on the individual number. The reader can be programmed via a laptop computer or an optional modem tied into a phone line. When vehicles pass by the BA-220 DualBeam reads the barcode and checks to see if that number has access. If access is granted the Good Read relay contact closes to open the gate. If access is denied the gate does not open and an optional No Read relay contact will close that can be connected to an indicator or alarm to indicate that access is denied.

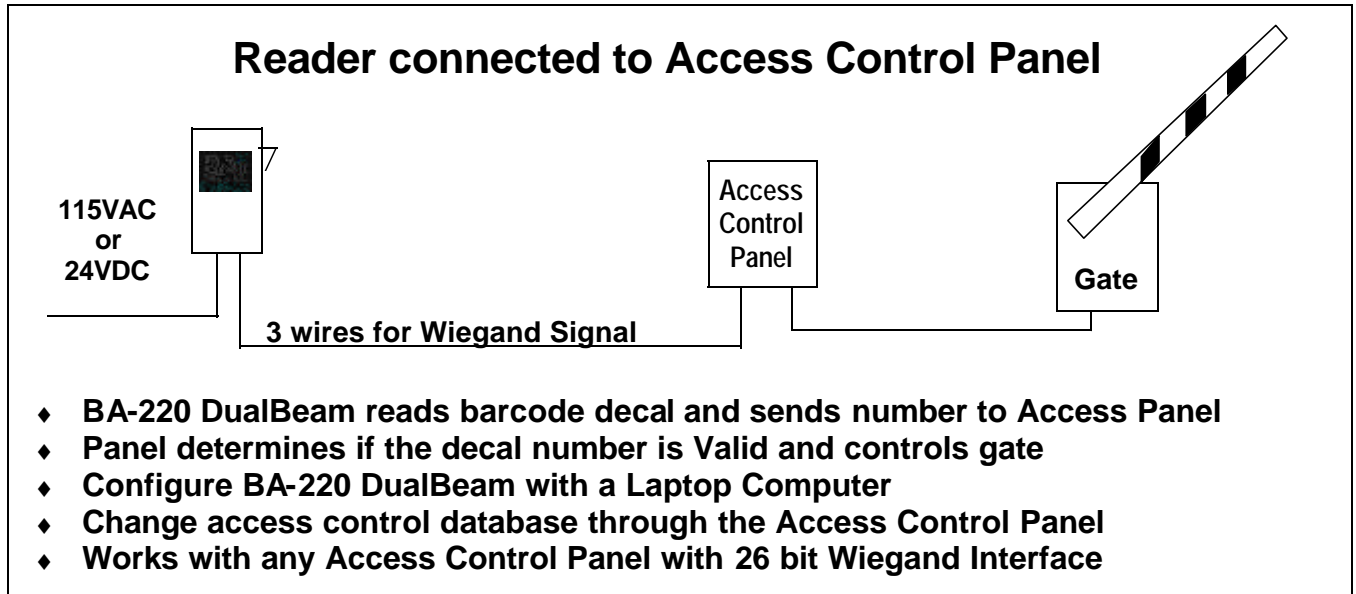
Wiring Needed:

- 2 conductor 18 AWG from reader to gate operator
- 3 conductor for AC power connection (follow local electrical codes)
- 2 conductor 18 AWG for 24VDC power connection

Optional:

Shielded 3 conductor 18 AWG for connecting RS232 serial port of reader to computer. Distance should not exceed 100 feet.

What Wiring do I need?

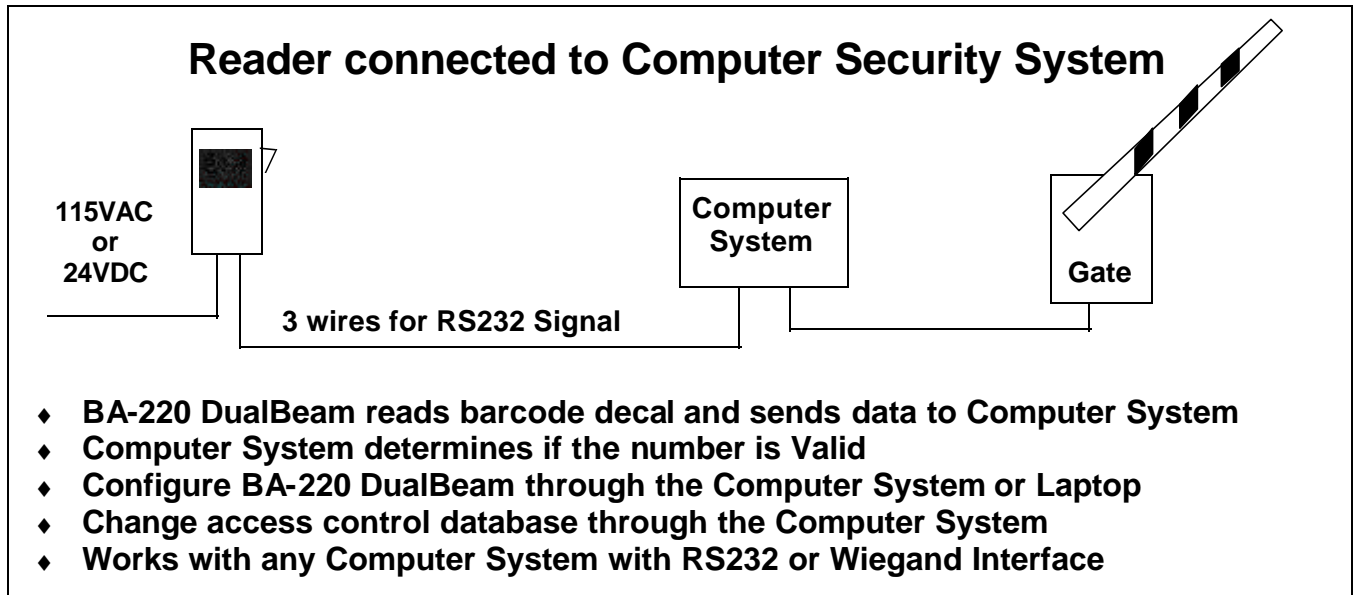


In this situation the BA-220 DualBeam is connected to an external Access Control panel by Wiegand communication. The barcode ID numbers are programmed into the Access Control panel and set up to have access granted or denied. When the vehicle pulls up to the BA-220 DualBeam it reads the decal and transmits the number to the Access Control panel, which checks the database for valid numbers. If access is granted, the panel opens the gate.

Wiring Needed:

- Shielded 3 conductor 18 AWG from reader to access control panel for Wiegand communication
- 3 conductor for AC power connection (follow local electrical codes)
- 2 conductor 18 AWG for 24VDC power connection

What Wiring do I need? Continued...



In this application the BA-220 DualBeam is connected to a Computer Security System through an RS232 serial port. Barcode decal ID numbers are programmed into the Computer Security system. When a vehicle pulls up to the BA-220 DualBeam reader, it reads the decal and transmits the number to the Security system. If valid, the Security system opens the gate.

Power Input

For 115VAC - Three wires (Ground, Neutral, Hot) Refer to local building code for requirements.

For 24VDC - Two wires (Ground and +24VDC) Recommend 18 AWG Refer to local building code for requirements.

Communications

For RS232 interface - Three wires (Transmit, Receive, Ground)

Minimum 3 conductor shielded cable 18 AWG

For Wiegand interface - Three wires (Wiegand 0, Wiegand 1, Ground)

Minimum 3 conductor shielded cable 18 AWG

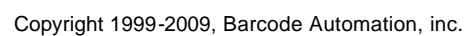
For Optional I/O

Good Read relay - Two wires 18 AWG

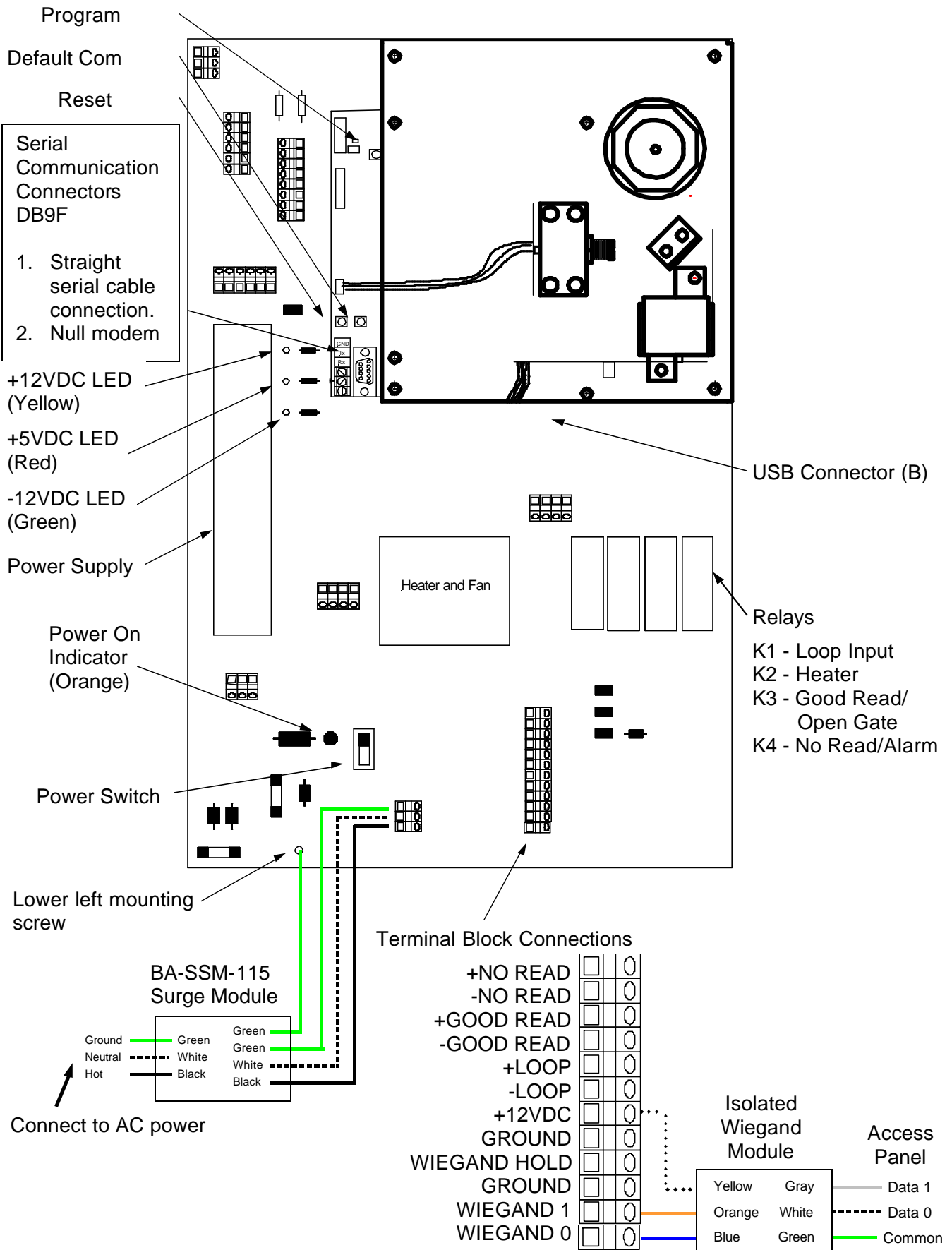
No Read relay - Two wires 18 AWG

Loop Detect - Two wires 18 AWG

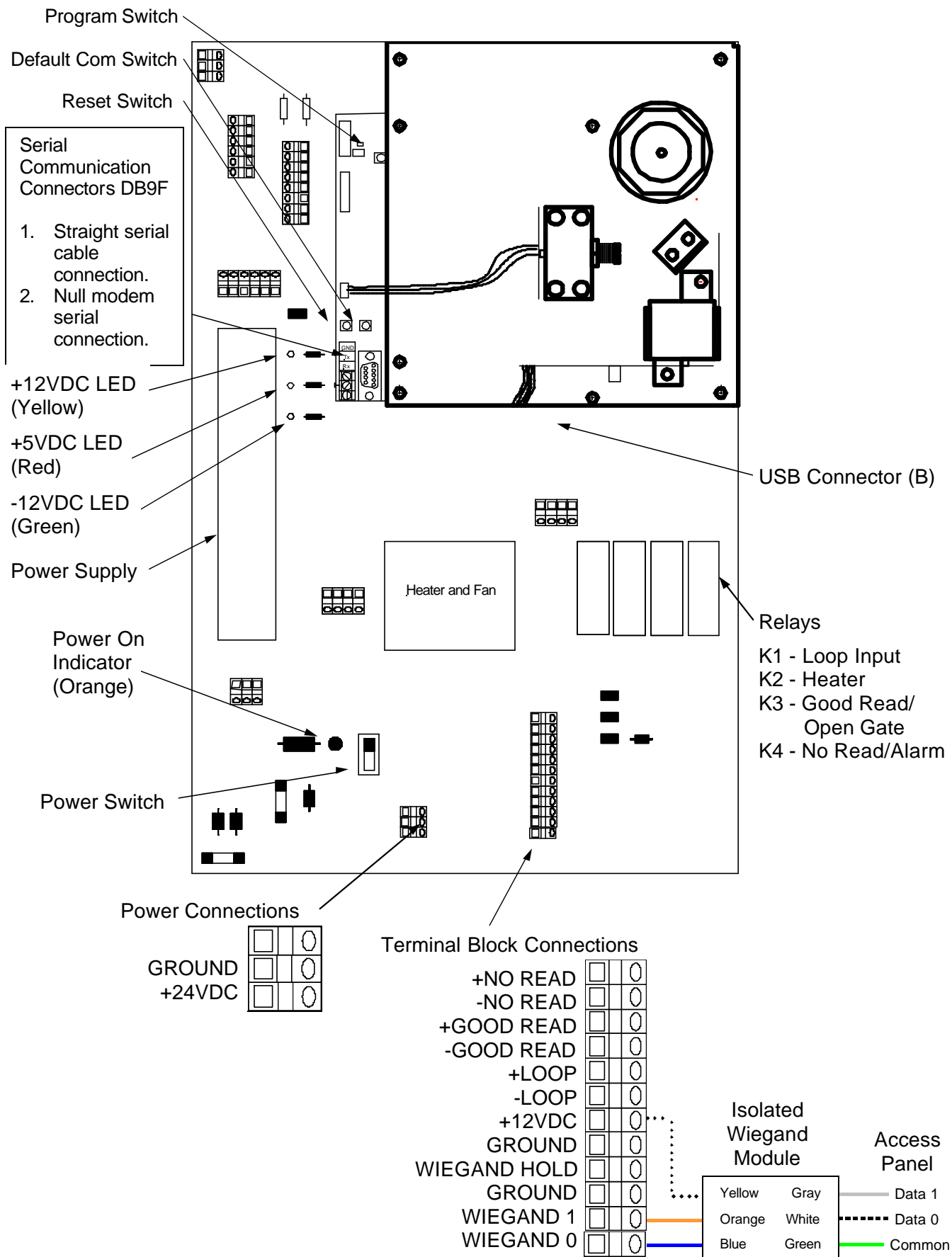
With a 34" mounting post, and a 6" curb, the BA-220 DualBeam (at 24" from the housing) can read barcode decals between 36" and 65" above the pavement .



Connections for 115VAC unit

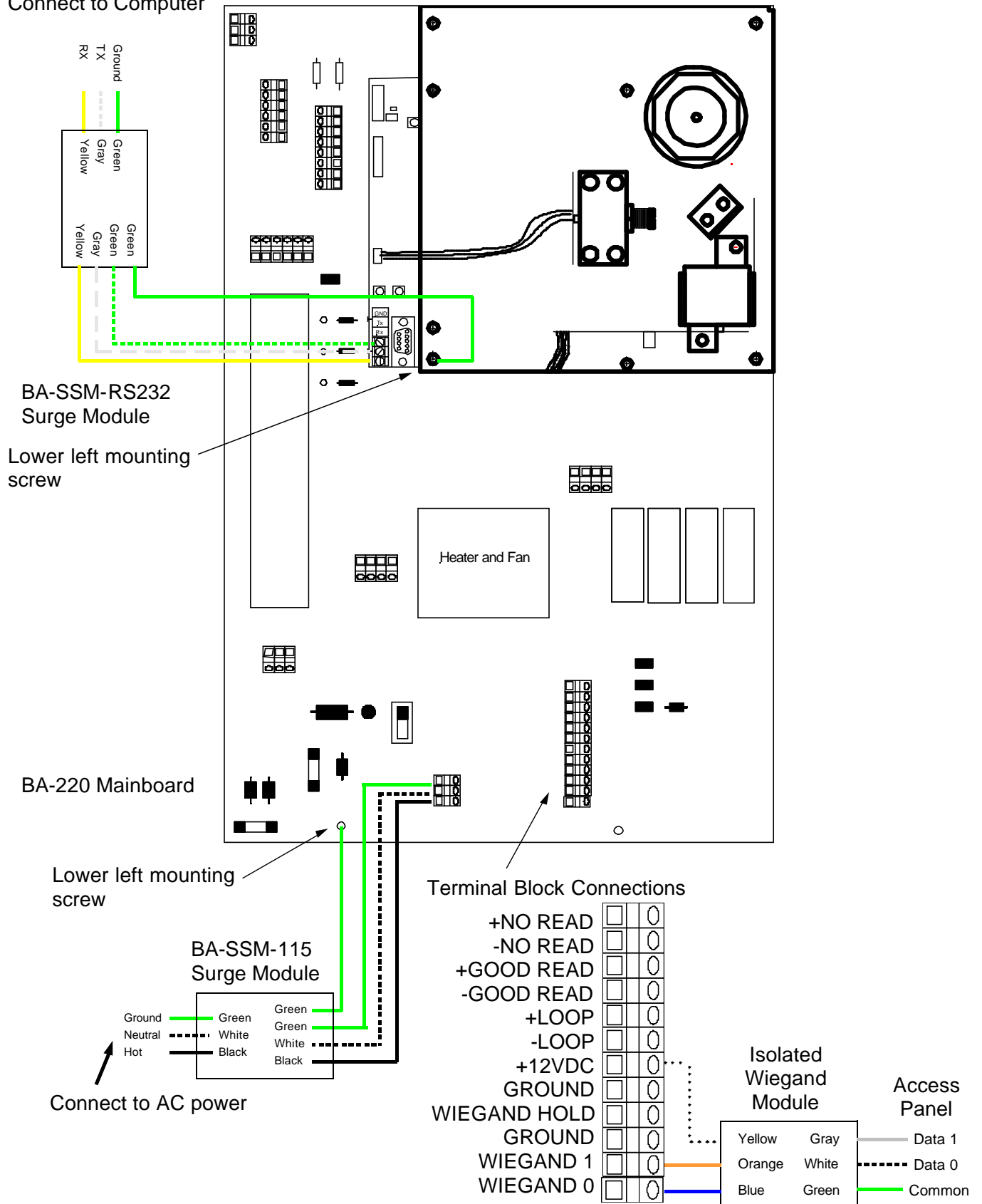


Connections for 24VDC unit



Surge Module Installation Detail

Connect to Computer



Surge Module Replacement Instructions

Surge Protection modules from BAI are sacrificial - if a powerful surge occurs they will open to protect the reader electronics. Surge modules cannot be repaired, they can only be replaced.

Important Safety Note: Turn reader power off before installing surge modules. **115VAC input readers must be turned off at the breaker panel.**

115VAC Surge module BA-SSM-115 (Black Case)

1. Turn reader power switch off. (for Safety, 115VAC input readers must be turned off at the breaker panel)
2. Disconnect old surge module and retain for warranty validation.
3. One side of module has three wires 6" long. This must be wired to the AC line from the circuit breaker with Black to HOT, White to NEUTRAL, Green to GROUND.
4. Other side of module has four wires 4" long. These wires go to the mainboard terminal block. The Green wire with the ring lug goes to the lower left mounting screw for the mainboard. The Black wire goes to HOT, White to NEUTRAL, Green to GROUND at TB1.
5. Once wiring is complete turn power on at breaker and then turn reader power switch ON.

Isolated Wiegand module BA-Isolated Wiegand (Green Case)

1. Turn reader power switch off.
2. Disconnect old module and retain for warranty validation.
3. One side of module has three wires 6" long. This must be wired to the Wiegand communication line from the access panel or telephone entry system with White to WIEGAND 0, Gray to WIEGAND 1 and Green to GROUND (Common).
4. Other side of module has three wires 4" long. These wires go to the mainboard terminal block. The Orange wire goes to WIEGAND 1, Blue to WIEGAND 0 and Yellow to +12VDC at TB18.
5. Once wiring is complete turn reader power switch ON.

Surge Module Replacement Instructions

Important Safety Note: Turn reader power off before installing surge modules.

RS232 surge modules are optional accessories and must be ordered separately. They should be used only for RS232 communications that are wired permanently from the reader to a computer interface. The Surge module is not necessary when temporarily connecting a laptop for diagnostics.

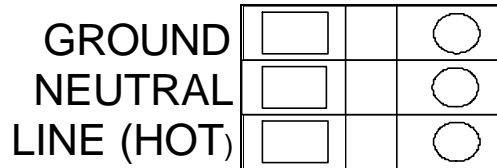
RS232 Surge module BA-SSM-RS232 (Blue Case)

1. Turn reader power switch off.
2. Disconnect old surge module and retain for warranty validation.
3. One side of module has three wires 6" long. This must be wired to the RS232 communication line from the computer system with Yellow to RX, Gray to TX and Green to GROUND.
4. Other side of module has four wires 4" long. These wires go to the decoder terminal block. The Green wire with the ring lug goes to the lower left standoff for the decoder. The Yellow wire goes to RX, Gray to TX and Green to GROUND at J12 on the decoder board.
5. Once wiring is complete turn reader power switch ON.

Connecting to the BA-220 DualBeam

115VAC power input

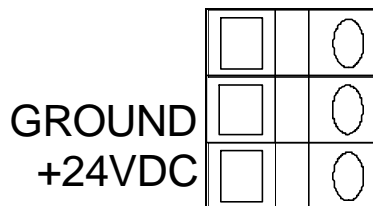
The power input terminal block for 115VAC input from the surge suppressor is marked:



Connect each wire to the proper input on the terminal block.

24VDC power input

The power input terminal block for 24VDC input is marked for the Ground and +24VDC leads. The top connection is not used. **Note: The 24VDC input must supply 2.5 Amps minimum to the Reader for it to operate correctly.**



Connect each wire to the proper input on the terminal block.

Connecting to the BA-220 DualBeam

Input/Output connections

The No Read and Good Read output terminals connect through optional relays. The + Loop and - Loop connections are for an optional input from a loop detector or other dry contact device.

The **+12VDC** terminal **is an output** and provides power to run accessories such as an external modem. **It should not be used for devices that need more than 500mA of current.**

The Ground terminals (both of them) connect to the BA-220 DualBeam electronic circuit ground.

The Wiegand Hold terminal is not implemented and should not be connected.

Wiegand 1 and Wiegand 0 are the Wiegand communication terminals. The Wiegand Isolator (Green case) module should be connected here.

+NO READ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>
-NO READ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>
+GOOD READ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>
-GOOD READ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>
+LOOP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>
-LOOP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>
+12VDC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>
GROUND	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>
WIEGAND HOLD	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>
GROUND	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>
WIEGAND 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>
WIEGAND 0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>

Finishing the BA-220 DualBeam Installation

After the Reader is mounted and the wiring is connected, all of the openings in the bottom of the enclosure **must** be sealed off. Use silicone, RTV, or other sealant to close off the opening in the bottom so it is watertight.

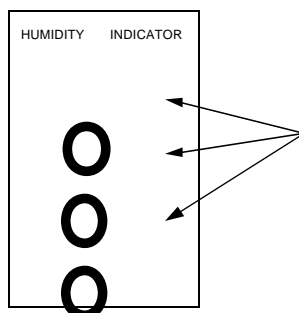
If there is condensation on the laser optics, the Reader may not read barcodes well or at all.

To prevent moisture from entering the enclosure, seal off the opening as described above. Then, open the plastic bag containing the desiccant pouch and remove it. Place the brown pouch and the humidity indicator card flat on the bottom of the unit before closing the door and tightening the latches. The desiccant will absorb moisture from the air in the Reader for a long time before becoming saturated.

Note: Put the desiccant in the reader AFTER the installation is complete and you are ready to close up the box.

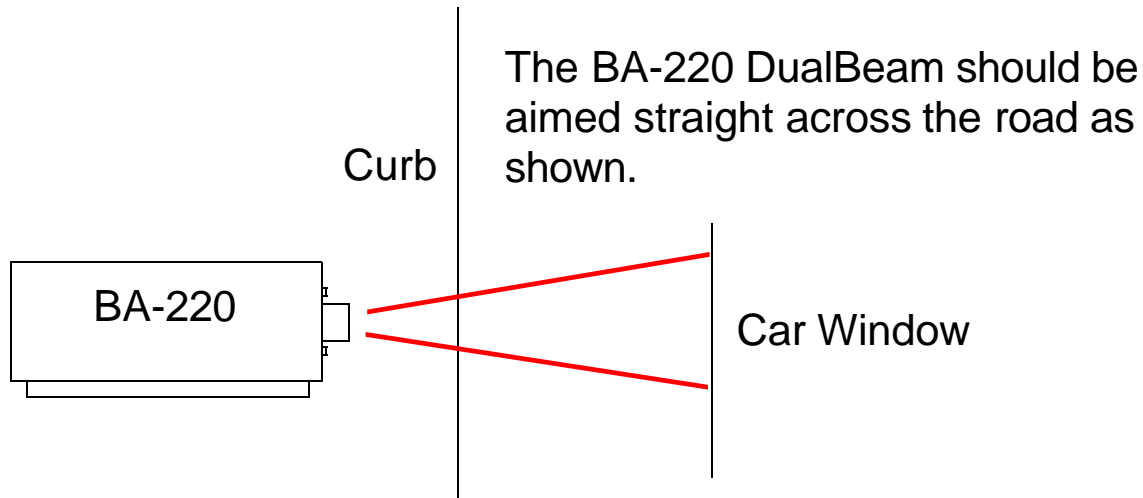
Each time you open the Reader for service immediately check the humidity indicator card. If the humidity card circles are all pink, change out the desiccant pouch and replace it with a fresh one.

BE SURE TO CHECK THE HUMIDITY CARD FIRST WHEN OPENING THE READER. After the door is opened, the card will react to humidity in the outside air and usually turn pink to show how humid the outside air is. As long as the card is not all pink when you first open the door there is no need to change the desiccant bag.



If all 3 blue circles are pink when Reader is first opened the desiccant should be changed.

Mounting Angle



Powering Up the BA-220 DualBeam

When testing the BA-220 DualBeam you should have a laptop computer on hand that can communicate with the reader. The reason for this is to take advantage of the diagnostics and test programs that are built in to the unit. For more information on how to communicate with the reader refer to the Operation and Configuration Manual.

When the BA-220 DualBeam is powered on:

- The Main Power indicator should light up
- The +12VDC LED (yellow), +5VDC LED (red) and -12VDC LED (green) should light up on the mainboard (See pages 16 - 17)
- The fan should begin spinning
- The gold mirror wheel (also known as the polygon) will spin

Approximately 15 - 30 seconds after the main switch is turned on:

- The laser should turn on
- The yellow LED on the decoder (Lsr Act) will turn on
- The yellow indicator light on the outside of the box will turn on

The BA-220 DualBeam is now ready to read barcodes.

LED Indicators

Look on the left hand edge of the decoder circuit board (the one that has the gold wheel spinning). There are LED indicators for several functions located in a column. From top to bottom they are:

Gd Read (Green) - will light for approx 1 second when a decal is read

Lsr Act (Yellow) - should be on when the laser is on

Rst Act (Green) - will light when the unit is being reset

Data0 Act (Red)

Data1 Act (Red)

These LED's indicate when the Wiegand communication lines (data 0 and data 1) are active. When the BA-220 DualBeam is not transmitting, the LED's should be off. If one or both of the LED's are on constantly the data line is connected to ground. Remove the wires connected to Wiegand 1 and Wiegand 0 and see if the LED's go off. If they do, the wiring may be at fault. Trace the communication wiring and be sure it is connected properly to the access control equipment.

Loop In (Yellow) - will light when the loop input is active

DigLo (Yellow) - will light when data is flowing from receiver board

DigHi (Yellow) - will light when data is flowing from receiver board

Diag (Green) - will light when decoder is in programming mode

Heat (Red) - will light when heater is turned on

Sync (Green) - will light when gold wheel is spinning

Reading a test barcode:

Refer to page 28 for how the barcode must be held for the BA-220 DualBeam to read it. Then, pass the barcode through the laser line. The green indicator on the outside of the box should light up for approximately 1 second to show that the barcode was read. Also, Gd Read (green) on the left edge of the decoder circuit board should also light up for 1 second.

LED Indicators Continued...

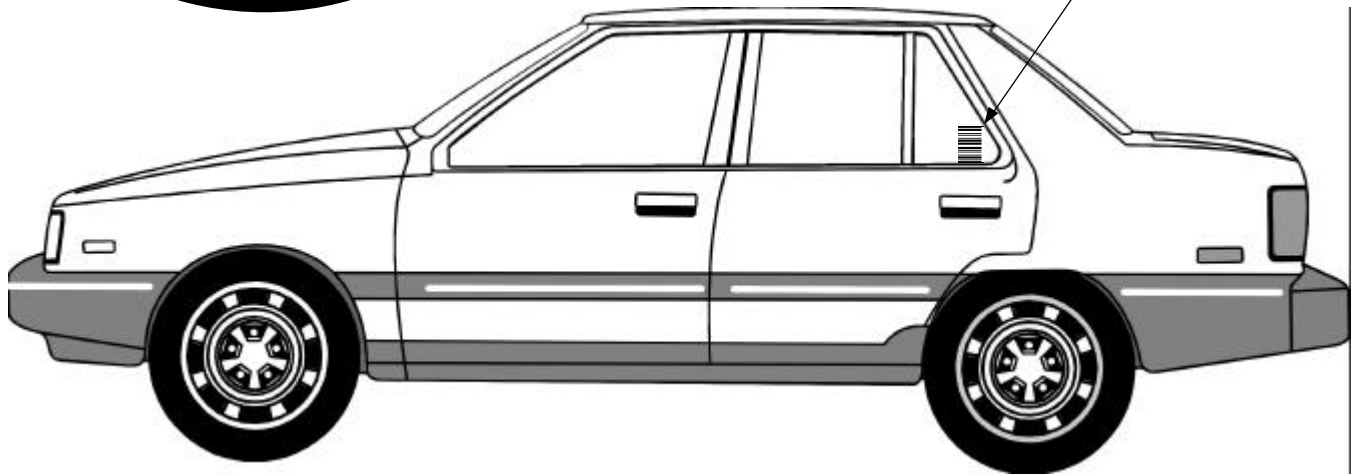
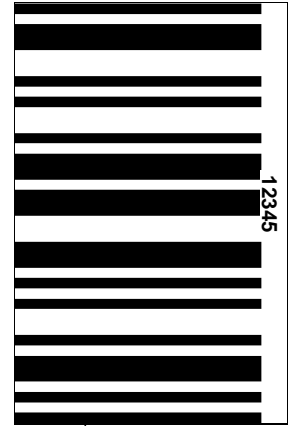
Important: The BA-220 DualBeam will not read the exact same barcode number until at least 1 second has passed since the first time it was read. Remember to wait 1 second between reads before trying to scan the same barcode. If you try to read it again sooner, the BA-220 DualBeam will ignore it. If a different barcode number is read, you will see the green indicator light. The only time you need to wait 1 second between reads is if you have only 1 barcode number to test with.

As you pass the barcode through the laser line watch the two red LED's (Data0 Act and Data1 Act) that show the status of the Wiegand data lines. When the barcode is read, both should "flash" or "flicker" red very quickly. These "flashes" indicate that the BA-220 DualBeam has sent out the Wiegand communication pulses for the barcode. Note: These "flashes" are very fast - to be certain to see them look directly at the indicators and shade them from the Sun if necessary. At this point the BA-220 DualBeam is ready for operation.

Barcode Label Placement on Vehicles



YES



1. Always place the decals on the same side of the vehicle that the reader is on.
2. Apply to the outside of the window glass. Decals will not read reliably through the glass.
3. Orient decal with the stripes running horizontal. (as shown).
4. The bottom of the decal should be at least 36 inches above the ground.
5. The top of the decal should be no more than 65 inches above the ground.
6. Always prepare the window before applying the decal by scrubbing with SoftScrub or other mild abrasive cleaner. Do not use glass cleaners that contain silicone.